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Yoshiomi Kondoh

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FOLEY AND LARDNER LLP
SUITE 500
3000 K STREET NW
WASHINGTON, DC 20007

EXAMINER

BARTON, JEFFREY THOMAS

ART UNIT

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05/11/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Response to Amendment

1. The amendment filed on 11 February 2009 does not place the application in condition for allowance.

Status of Rejections Pending Since the Office Action of 11 September 2008

2. The rejection of claim 34 under 35 U.S.C. §112, first paragraph is maintained in part.
3. The rejection of claims 1-4 under 35 U.S.C. §102(e) as anticipated by Venkatasubramanian et al is withdrawn due to Applicant's amendment.
4. All other rejections are maintained.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-25 and 28-34 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There is no support in the specification as originally filed for a device in which the respective first thermoelectric converter elements are connected by an electric conduction material *and* the respective second thermoelectric converter elements are electrically connected by another electric conduction material, as required in instant claims 1-4. The instant disclosure teaches either a voltage source or voltage output provided in the place of one of the instant conduction materials. Claims 5-25 and 28-34 depend from these claims and are therefore rejected on the same grounds.

In addition, particular to claims 8-25 and 28-33, there is no disclosure of a thermoelectric effect device that operates as a Peltier effect device, which includes and uses the same first and second thermoelectric converter elements as the energy direct conversion systems of claims 3-5. In effect, the claims as currently presented require simultaneous functioning of a single pair of thermoelectric converter elements in Seebeck and Peltier mode, which is not disclosed in the specification as originally presented.

In addition, particular to claim 34, there is no support for an arrangement wherein the two first or two second semiconductor materials are arranged in series without an intervening material having a different Seebeck coefficient. It appears the claim is directed to an embodiment as shown in Figure 2, for example, which requires an electrical conductor connecting two elements of a common type. Such metallic conductors have Seebeck coefficients that are different from conventional thermoelectric materials. Applicant provides no teaching of series connection without

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such a conductor, nor is it clear that this would be possible. Therefore the specification does not support the claim as currently recited.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8-25 and 28-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 8-13 require a thermoelectric effect device that operates as a Peltier effect device, which includes and uses the same first and second thermoelectric converter elements as the energy direct conversion systems of claims 3-5. In effect, the claims as currently presented require a single pair of thermoelectric converter elements to be able to operate simultaneously in Seebeck and Peltier mode. Based on the disclosure, it is not clear how such a device can be made or used. For purposes of examination, the claim is treated herein as though separate thermoelectric devices operating in Peltier and Seebeck mode are contemplated.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

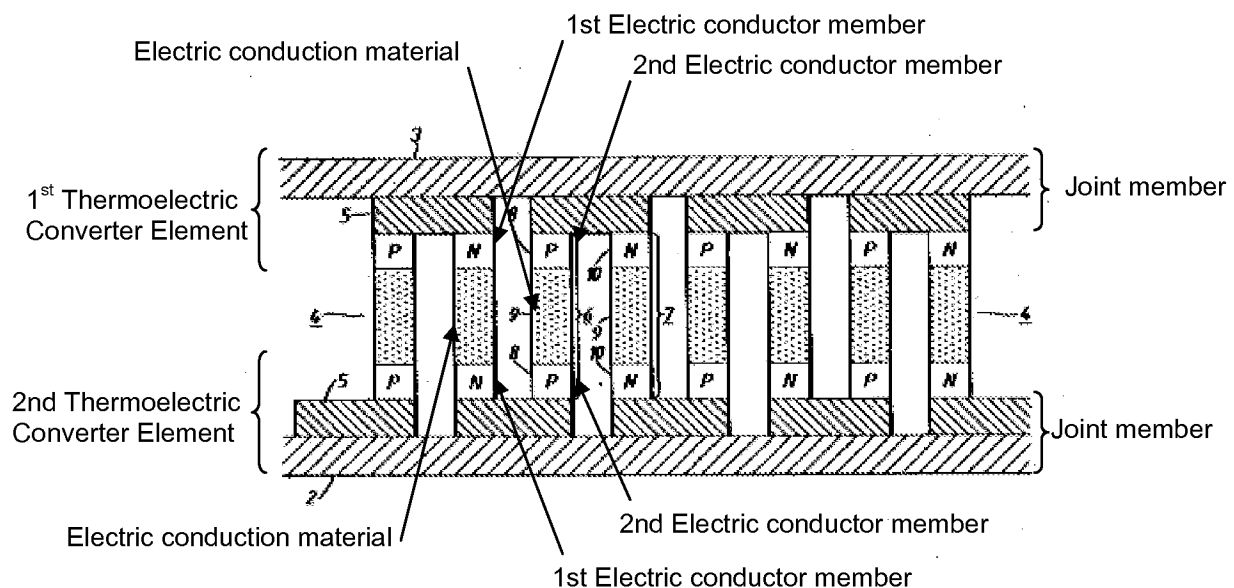
A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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9. Claims 1-4 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Bijvoets (U.S. 5,006,178).

Bijvoets discloses a thermoelectric device as shown within the FIGURE. The FIGURE of Bijvoets is reproduced below, with annotations describing how the features shown therein correspond to the features of the instant claims. The configuration shown in the FIGURE corresponds to that instantly claimed, as shown and explained below:



The joint members are considered to correspond to combined features 3 and 5 of the first thermoelectric converter element and combined features 2 and 5 of the second thermoelectric converter element. The sides of the respective first electric conductor members that are joined by an electric conduction material clearly face each other and are disposed opposite to the respective joint members as claimed, as are the sides of

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the respective second electric conductor members that are joined by another electric conduction material.

Further regarding claims 1 and 2, Bijvoets discloses passing electric current through the device to obtain a temperature difference, making an endothermic and exothermic section as claimed, with a distance between sections and the required temperature condition of the claim (Column 3, lines 56-64). The electrical connections of Bijvoets as shown have 1st electric conductor members connected to each other and second electric conductor members connected to each other, which is considered to correspond to an arrangement such that the first and second electric conductor members do not alternate with one another.

Further regarding claim 2, the figure shows $2n$ pieces of thermoelectric converter elements disposed as shown and described above.

Regarding claims 3 and 4, the figure shows a device having a structure as shown and described above. This structure corresponds to the instant heat transfer circuit system. Bijvoets discloses creating an electric current with the device when a temperature gradient is placed across the device, making a high temperature (i.e. endothermic) side and a low temperature (i.e. exothermic) side with a distance between sides and the required temperature condition of the claim (Column 3, lines 56-64). The electrical connections of Bijvoets as shown have 1st electric conductor members connected to each other and second electric conductor members connected to each other, which is considered to correspond to an arrangement such that the first and second electric conductor members do not alternate with one another.

Further regarding claim 4, the figure shows 2n pieces of thermoelectric converter elements disposed as shown and described above.

Regarding claim 34, Bijvoets teaches a device in which two first electric elements 10 are arranged in series in an electrical circuit as claimed without an intervening said second thermoelectric converter element having a different Seebeck coefficient than the first electric conductor member, and wherein two second electric conductor members 8 are arranged in series without an intervening said first thermoelectric converter element. (Figure)

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets as applied to claims 1-4 and 34 above, and further in view of Yoo (U.S. 6,271,459).

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The disclosure of Bijvoets is as stated above for claims 1-4 and 34.

The difference between Bijvoets and claim 5 is the requirement of multiple energy producing devices from different heat sources.

Yoo teaches using multiple thermoelectric devices to produce electricity from multiple heat sources as in figure 3.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize multiple thermoelectric devices and multiple heat sources as in Yoo for the thermoelectric devices of Bijvoets because the additional devices and heat sources help create more electricity and are well known in the art to increase power production by using multiple devices/sources. Because Bijvoets and Yoo are concerned with thermoelectric power production, one would have a reasonable expectation of success from the combination. Thus the combination meets the claim.

13. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets as applied to claims 1-4 and 34 above, and further in view of Pflanz (U.S. 6,100,600).

The disclosure of Bijvoets is as stated above for claims 1-4 and 34.

The difference between Bijvoets and the claims is the requirement of the electrical energy to be used for electrolysis.

Pflanz teaches a power plant system that uses thermoelectric elements among other elements to produce electrical power. The electrical power is utilized for the

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electrolysis of water into oxygen and hydrogen, thus turning electrical potential energy into chemical potential energy (column 9, last paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to connect the thermoelectric device with an electrolysis device as in Pflanz for the device of Bijvoets because the production of hydrogen decouples the energy flow from the statistically distributed generation and consumption and allows for a continuous energy flow regardless of outside conditions (Pflanz column 10, paragraph 3). Because Pflanz and Bijvoets are concerned with thermoelectric energy production, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

14. Claims 8, 9, 11, 12, 14, 15, 17, 18, 20, 21, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets as applied to claims 1-4 and 34 above, and further in view of Kim et al. (U.S. 5,987,891).

The disclosure of Bijvoets is as stated above for claims 1-4 and 34.

The differences between Bijvoets and the claims include the following: while Bijvoets discloses both the thermoelectric effect devices and energy conversion devices of all the claims, Bijvoets does not disclose using multiple devices connected together in the manner of the claims; Bijvoets does not disclose the use of a switch to control feedback of power; and Bijvoets does not disclose using a switch to cut power from a direct power source of the thermoelectric device.

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Kim teaches a refrigerator/warmer as shown in figure 1 that utilizes two sets of thermoelectric elements to produce power and produce a temperature gradient. The first set, elements 3, 4 and 5, produce an electric current from a temperature gradient between the inside and outside of the unit. The second set, element 6, utilizes power from the first set to create a temperature gradient between the inside and outside of the unit. For example in heating applications, units 6 heat the inside of the box causing elements 3, 4 and 5 to produce electricity from the temperature created by unit 6, which is then returned to power unit 6.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the configuration of Kim with the thermoelectric devices of Bijvoets because the configuration allows for cooling/heating while utilizing the temperature gradient created to supply the power, thus saving on power consumption and the devices of Bijvoets have enhanced efficiency (3 times as high as standard thermoelectric devices) for such a combination due to the distance created between the hot and cold sides (Bijvoets column 5, example I). It would have been further obvious to one of ordinary skill in the art at the time the invention was made to utilize switches to control the flow of electricity or external voltage sources in the startup phase of the combination because these elements are well known in the art for electrical control and the running of processes under startup conditions. Because Bijvoets and Kim are concerned with thermoelectric devices, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

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15. Claims 10, 13, 16, 19, 22, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets in view of Yoo as applied to claim 5 above, and further in view of Kim et al. (U.S. 5,987,891).

The disclosure of Bijvoets in view of Yoo is as stated above for claim 5.

The differences between Bijvoets in view of Yoo and the claims include the following: while Bijvoets in view of Yoo discloses both the thermoelectric effect devices and energy conversion devices of all the claims, Bijvoets in view of Yoo does not disclose using multiple devices connected together in the manner of the claims; Bijvoets in view of Yoo does not disclose the use of a switch to control feedback of power; and Bijvoets in view of Yoo does not disclose using a switch to cut power from a direct power source of the thermoelectric device.

Kim teaches a refrigerator/warmer as shown in figure 1 that utilizes two sets of thermoelectric elements to produce power and produce a temperature gradient. The first set, elements 3, 4 and 5, produce an electric current from a temperature gradient between the inside and outside of the unit. The second set, element 6, utilizes power from the first set to create a temperature gradient between the inside and outside of the unit. For example in heating applications, units 6 heat the inside of the box causing elements 3, 4 and 5 to produce electricity from the temperature created by unit 6, which is then returned to power unit 6.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the configuration of Kim with the thermoelectric devices of Bijvoets in view of Yoo because the configuration allows for cooling/heating while

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utilizing the temperature gradient created to supply the power, thus saving on power consumption and the devices of Bijvoets in view of Yoo have enhanced efficiency (3 times as high as standard thermoelectric devices) for such a combination due to the distance created between the hot and cold sides (Bijvoets column 5, example I). It would have been further obvious to one of ordinary skill in the art at the time the invention was made to utilize switches to control the flow of electricity or external voltage sources in the startup phase of the combination because these elements are well known in the art for electrical control and the running of processes under startup conditions. Because Bijvoets in view of Yoo and Kim are concerned with thermoelectric devices, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

16. Claims 28, 29, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets in view of Kim as applied to claims 8, 9, 11, 12, 14, 15, 17, 18, 20, 21, 23 and 24 above, and further in view of Pflanz (U.S. 6,100,600).

The disclosure of Bijvoets in view of Kim is as stated above for claims 8, 9, 11, 12, 14, 15, 17, 18, 20, 21, 23 and 24.

The difference between Bijvoets in view of Kim and the claims is the requirement of the electrical energy to be used for electrolysis.

Pflanz teaches a power plant system that uses thermoelectric elements among other elements to produce electrical power. The electrical power is utilized for the

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electrolysis of water into oxygen and hydrogen, thus turning electrical potential energy into chemical potential energy (column 9, last paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to connect the thermoelectric device with an electrolysis device as in Pflanz for the device of Bijvoets in view of Kim because the production of hydrogen decouples the energy flow from the statistically distributed generation and consumption and allows for a continuous energy flow regardless of outside conditions (Pflanz column 10, paragraph 3). Because Pflanz and Bijvoets in view of Kim are concerned with thermoelectric energy production, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

17. Claims 30 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets in view of Yoo and further in view of Kim as applied to claims 10, 13, 16, 19 and 25 above, and further in view of Pflanz (U.S. 6,100,600).

The disclosure of Bijvoets in view of Yoo and further in view of Kim is as stated above for claims 10, 13, 16, 19 and 25.

The difference between Bijvoets in view of Yoo and further in view of Kim and the claims is the requirement of the electrical energy to be used for electrolysis.

Pflanz teaches a power plant system that uses thermoelectric elements among other elements to produce electrical power. The electrical power is utilized for the electrolysis of water into oxygen and hydrogen, thus turning electrical potential energy into chemical potential energy (column 9, last paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to connect the thermoelectric device with an electrolysis device as in Pflanz for the device of Bijvoets in view of Yoo and further in view of Kim because the production of hydrogen decouples the energy flow from the statistically distributed generation and consumption and allows for a continuous energy flow regardless of outside conditions (Pflanz column 10, paragraph 3). Because Pflanz and Bijvoets in view of Yoo and further in view of Kim are concerned with thermoelectric energy production, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

Double Patenting

18. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

19. Claims 1-25 and 28-34 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-15 of copending Application No. 10/537,357. Although the conflicting claims are not identical, they are not patentably distinct from each other because the plurality of elements within the copending application also meets the requirements of the present invention for 2n pieces (see copending claims 2, 3 and 4).

Response to Arguments

20. Applicant's arguments filed on 11 February 2009 have been fully considered but they are not persuasive.

Applicant argues that the amendment rendered the rejection of claim 34 under 35 U.S.C. §112, first paragraph moot. The examiner agrees that part of the basis for the rejection no longer applies, but maintains the rejection for other reasons presented previously.

Applicant argues that Bijvoets does not teach all structural limitations of the instant claims. The Examiner respectfully disagrees, and points out in detail where all aspects of claims 1-4 and 34 are taught in the reference. See the rejection above.

Applicant further argues that the additional references do not remedy the deficiencies of Bijvoets. However, as pointed out above, Bijvoets is not deficient. Therefore the rejections are maintained.

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571)272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeffrey T. Barton/
Examiner, Art Unit 1795
8 May 2009